

Nanobiotechnology:

Medical science gets small

By ONR Public Affairs

The Navy is looking at the use of tiny devices to do what a human nurse would normally do, only from within the human body. Similar to Star Trek: Voyager's 'Borg Nano-probes,' (but more benign) these virus-sized devices are made from biomolecules and tiny nickel propellers.

So far, the Navy has been able to successfully assemble these devices inside test-tubes. Eventually, the Navy wants to use them in ultraminiaturized sensors and power sources. Funded by the Office of Naval Research in Arlington, Va., this biotechnological achievement may well usher in a generation of microscopic robotic medical devices that would be assembled within living cells.

These could then move about the human body, minister to its needs, or detect chemical signals from body cells and calculate and precisely dispense drugs

and other treatments. Powered by the enzyme ATP (adenosine triphosphate), the so-called 'energy of life,' these hybrid nanodevices can be assembled, maintained, and repaired using the physiology of life itself. "With this demonstration, we believe we are defining a whole new technology," said Carlo Montemagno, lead scientist for this program being conducted at Cornell University in New York.

However, researchers caution that before the nanodevices can actually carry out their intended role as 'nanonurses' inside living organisms, a higher operational success rate needs to be achieved.

Nanobiotechnology is a relatively new field of science that merges living systems with fabricated nonliving materials, such as silicon, at the 'nano' scale, where a nanometer equals one billionth of a meter. Eventually, researchers would like to engineer biomolecular motors powered by photons — light energy — instead of ATP.

They also plan to add computational and sensing capabilities to the nanodevices, which ideally would be able to self-assemble inside human cells. Like something out of a Captain Marvel story, the diminutive propellers were fabricated using electron gun evaporation, isotropic etching and electron beam lithography. Thin coatings of attachment chemicals encouraged the propellers to self-assemble. In initial tests, some of the biomolecular motors spun their propellers for more than two hours, at eight revolutions per second.

"This is all new for us ... and for everyone else in this line of work," said Montemagno, who noted that only five of the first 400 motors worked." Montemagno added, "These machines are as small as virus particles -- it's hard to keep them from clumping together."

More information about the Office of Naval Research can be found at www.onr.navy.mil.

Anthrax immunizations may restart in October 2001

By Jim Garamone
American Forces Press Service

Officials are confident that Bioport, the sole producer of the anthrax vaccine, will overcome problems and receive approval for their new facility.

"The producer of the vaccine has made some substantial progress in recent weeks," said Marine Maj. Gen. Randall West, senior adviser to the Secretary of Defense for Biological and Chemical Protection.

West said DoD has been speaking with the Food and Drug Administration, the Centers for Disease Control and others monitoring Bioport.

"They and we have confidence that [Bioport is] going to achieve approval for new production and that will probably occur not later than the third quarter of the coming year," he said during an interview.

This means full-scale vaccination would probably begin by October.

On Nov. 28, DoD announced it was halting anthrax immunizations for service members bound for Korea. Currently, only service members and DoD civilians reporting for duty in Southwest Asia will receive the inoculations.

In Korea, the vaccination program hasn't completely stopped but it has been slowed down, West said.

"There are some vaccine supplies there that we will continue to use until they are gone," he said.

Officials made the decision because of the shortage of FDA-certified vaccine. The vaccine program will resume once tested and certified supplies of the vaccine start flowing.

Officials said service members and DoD civilians who have started the six-shot series will not have to start at ground

zero when the program restarts.

"Personnel that have had their shot protocols interrupted will not have to go back and start over. They will pick up where they left off," West said.

West said DoD is disappointed that it cannot provide vaccine to the total force right now.

"We're trying to provide it in the area where we feel the threat is highest," he said. "There is, however, some additional supply available to a unit if they were deploying against an adversary that we knew to possess the capability and had reason to believe might use it."

The inoculation program has generated controversy. About 400 service members have refused the shots.

As of Dec. 7, 2000, almost 2 million individual doses of the vaccine have been administered to 496,026 active and

(See Anthrax Pg. 8)